Ability of carbon footprint to reflect the environmental burden of a product or service – an empirical study

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Ability of Carbon Footprint (CFP) to reflect the environmental burden of a product/service – An empirical study

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What the world is looking at today…

⇒ **Extensive use of carbon footprint (CFP), which is:**

- An accepted reference indicator for climate change
- An assessment of the 6 GHG of the Kyoto Protocol (CO_2, CH_4, N_2O, SF_6, PFCs, HFCs)

⇒ **What about the consideration of other impacts on environment?**

⇒ **Is carbon footprint representative of other environmental impacts?**

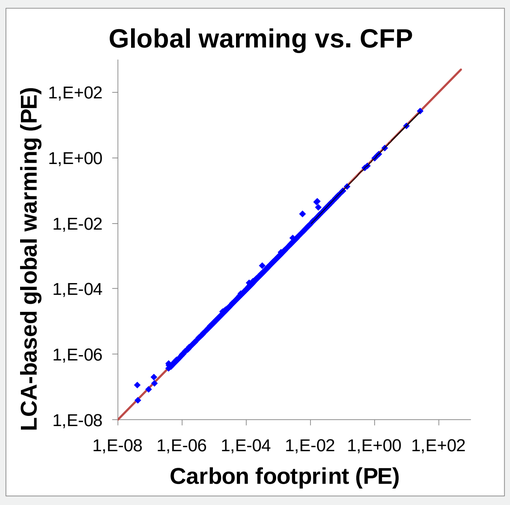
Correlation between CFP and other environmental impacts?

OBJECTIVES AND METHODS

- Comparisons of carbon footprint with other relevant LCA impact categories
- Inclusion of the USEtox™-based toxic impacts:
- Normalization of all impacts (including CFP) to support the comparisons
- 637 product/service life cycle inventories tested (from Ecoinvent database)

RESULTS

Carbon footprint vs. LCA-based global warming



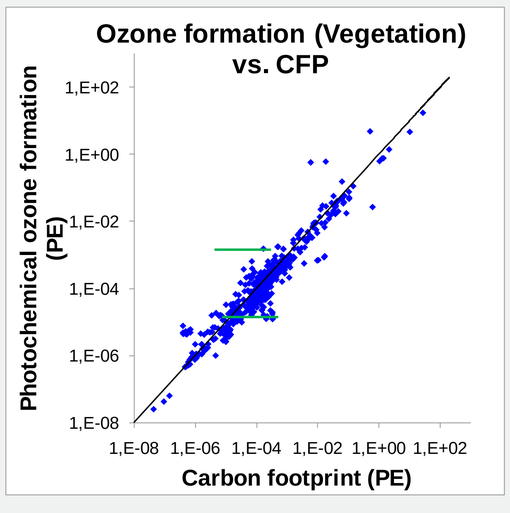
- Overall excellent match (-5% difference)
- Large differences when significant emissions of NMVOC or ODS (e.g. TCE, TFE productions)

Carbon footprint is roughly the same as LCA-based global warming

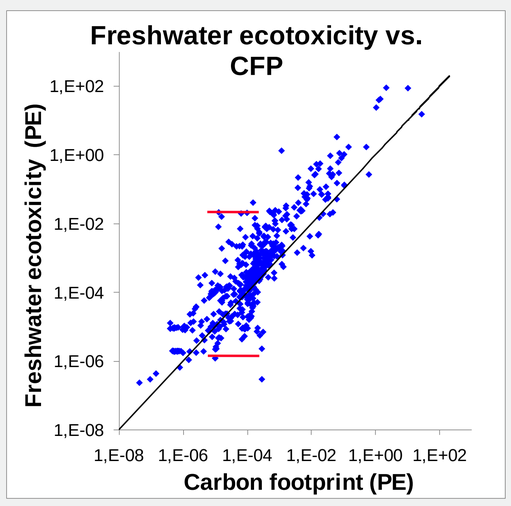
Carbon footprint vs. non-toxic impacts

- Overall good correlation for acidification, terrestrial eutrophication, photochemical ozone formation
- Impacts primarily originating from the combustion of fossil fuels used in energy production

Carbon footprint is an acceptable representative



Carbon footprint vs. toxic impacts



- Emissions of toxic substances arising from various processes
- No direct relation with energy production

Carbon footprint is not an acceptable representative

Uncertainties

Expected underestimations due to inventory incompleteness:

- Good coverage for emissions from combustion of fossils
- Limited coverage for emissions of chemicals in other processes

Several non energy-related emissions likely to be missing
⇒ Real picture expected to be worse

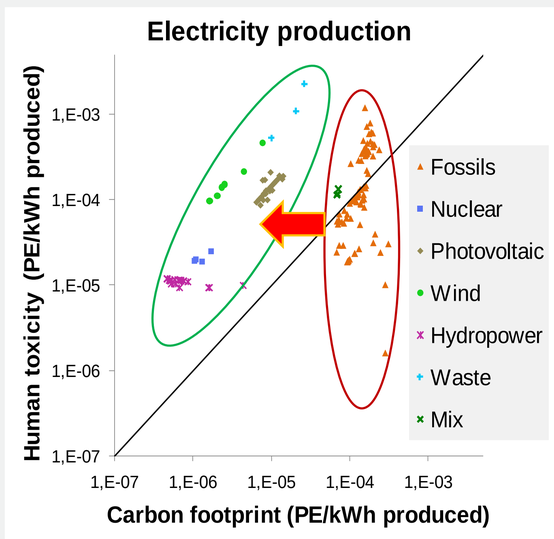
CONCLUSION AND PERSPECTIVES

CFP not representative in many cases

Risk of sub-optimization

Example of switch from fossil fuels to use of renewables in energy production (cf. opposite graph):

- Overlooking of human toxicity
- Risk of misinterpretation (e.g. overutilization of terms “green” or “eco-friendly”)



Further work needed to:

- Identify patterns among the different categories of products/services
- Quantify the uncertainties and their influences on the results (in particular for the toxicity-related impacts)

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